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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,168	12/23/2005	Toru Takenaka	SAT-16280	7708

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EXAMINER	
MARC, MCDIEUNEL	

ART UNIT	PAPER NUMBER
3664	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,168	TAKENAKA ET AL.	
	Examiner	Art Unit	
	MCDIEUNEL MARC	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/23/2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-19 are pending and claims 20-79 have been cancelled.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-19 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of copending Application No. 12/603,116. Although the conflicting claims are not identical, they are not patentably distinct from each other because the clams of this application are broader than the claims of this application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Takenaka (US 5459659 A).

As per claim 1, Takenaka US 5459659 A teaches a control device (see fig. 9, particularly the micro attitude controller) of a legged mobile robot (see abstract, particularly "biped mobile robot") that travels by moving legs extended from its body (see fig. 9, wherein the leg being shown moving away from the trunk/body), said control device (see fig. 9, particularly the micro attitude controller) being configured to sequentially determine instantaneous values of a desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) and a desired floor reaction force (see abstract, particularly "ground reaction force") of the legged mobile robot (see abstract, particularly "biped mobile robot") by using a dynamic model (see col. 1, line 56) that expresses a relationship between at least a motion of the robot and a floor reaction force (see col. 2, line 1), and also to control an operation of the robot at the same time so as to make the robot follow the determined instantaneous values of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) and the desired floor reaction force (see col. 2, line 1), comprising: permissible range setting means for setting a permissible range of a restriction object amount, the restriction object amount being a vertical component of a floor reaction force moment (see abstract, particularly "ground reaction force" , fig. 9 and col. 28, line 66 -- to -- col. 30, line -21) or a component of the floor reaction force moment (see abstract, particularly "ground reaction force") in floor surface normal line direction to be applied to a robot in operation (see col. 30, lines 11-21), following the desired motion and the desired floor reaction force (see col. 2, line 1); and desired instantaneous value determining means for determining, on the basis of at least a difference between a desired state amount related to a posture of the robot about a vertical axis or about a floor surface normal line axis and an actual state amount of the robot and the permissible range (see col. 28, lines 37-65),

instantaneous values of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) and the desired floor reaction force (see abstract, particularly "ground reaction force") such that a deviation between a floor reaction force moment (see abstract, particularly "ground reaction force") balancing with the desired motion on the dynamic model (see col. 1, line 56) and a floor reaction force moment (see abstract, particularly "ground reaction force") of the desired floor reaction force (see abstract, particularly "ground reaction force") approximates the difference to zero (see col. 2, line 60), while having the restriction object amount, which is associated with the desired floor reaction force (see col. 2, line 1, abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21), fall within the permissible range (see col. 2, line 1).

As per claim 2, Takenaka US 5459659 A teaches a control device wherein the desired instantaneous value determining means comprises means for determining a compensating floor reaction force moment (see abstract, particularly "ground reaction force"), which is an additional floor reaction force moment (see abstract, particularly "ground reaction force") for approximating the difference to zero (see col. 2, line 60) on the basis of the difference, and means for determining a correction amount of a predetermined provisional instantaneous value (see abstract for correction of motion) such that the restriction object amount does not exceed the permissible range on the basis of at least a floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21) that balances with the predetermined provisional instantaneous value of the desired motion on the dynamic model (see col. 1, line 56) and the compensating floor reaction force moment (see abstract, particularly "ground reaction force"), wherein the provisional instantaneous value is corrected on the basis of

the determined correction amount so as to determine an instantaneous value of the desired motion (see abstract for correction of motion, col. 11, lines 48-54, predicted value has been considered as instantaneous values).

As per claim 3, Takenaka US 5459659 A teaches a control device that further comprising means for determining a model correction floor reaction force moment (see abstract, particularly "ground reaction force"), which is an additional floor reaction force moment (see abstract, particularly "ground reaction force") for approximating a state amount of the dynamic model (see col. 1, line 56) to a predetermined state amount, wherein the means for determining a correction amount of a predetermined provisional instantaneous value of the desired motion (see abstract for correction of motion) determines a correction amount of a provisional instantaneous value of the desired motion such that the restriction object amount does not exceed the permissible range (see abstract for correction of motion) on the basis of at least a floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21) that balances with the predetermined provisional instantaneous value on the dynamic model (see dynamic model as noted above), the compensating floor reaction force moment (see abstract, particularly "ground reaction force"), and the model correction floor reaction force moment (see abstract, particularly "ground reaction force").

As per claim 4, Takenaka US 5459659 A teaches a control device wherein the correction amount of the predetermined provisional instantaneous value is a correction amount of a motion that changes a vertical component (see abstract for correction of motion) or a component in floor surface normal line direction (see col. 30, lines 11-21) of an angular momentum changing rate of the robot (see cols. 29-30).

As per claim 5, Takenaka US 5459659 A teaches a control device wherein the motion that changes the vertical component or the component in floor surface normal line direction (see col. 30, lines 11-21) of the angular momentum changing rate of the robot is a motion of a body of the robot and/or an arm extended from the body of the robot (see fig. 9, wherein the leg being shown moving away from the trunk/body).

As per claim 6, Takenaka US 5459659 A teaches a control device (see fig. 9, particularly the micro attitude controller) of a legged mobile robot (see abstract, particularly "biped mobile robot") that travels by moving legs extended from its body, said control device being configure to sequentially determine an instantaneous value of a desired motion of the legged mobile robot (see abstract, particularly "biped mobile robot") by using a dynamic model (see col. 1, line 56) that expresses a relationship between at least a motion of the robot and a floor reaction force (see abstract, particularly "ground reaction force"), and also to control an operation of the robot at the same time so as to make the robot follow the determined instantaneous value of the desired motion, comprising: permissible range setting means for setting a permissible range of a restriction object amount, the restriction object amount being a vertical component of a floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21) or a component of the floor reaction force (see abstract, particularly "ground reaction force") in floor surface normal line direction to be applied to a robot in operation, following the desired motion (see col. 30, lines 11-21); compensating floor reaction force moment (see abstract, particularly "ground reaction force") determining means for determining a compensating floor reaction force moment (see abstract, particularly "ground reaction force"), which is an additional floor reaction force moment (see abstract, particularly "ground reaction

force") for bringing a difference between a desired state amount related to a posture of the robot about a vertical axis or a floor surface normal line axis and an actual state amount of the robot close to zero (see col. 2, line 60) on the basis of at least the difference; and desired instantaneous value determining means for determining an instantaneous value of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) such that the restriction object amount, which is determined on the basis of a floor reaction force moment (see abstract, particularly "ground reaction force") balancing with the desired motion on the dynamic model (see col. 1, line 56) and the compensating floor reaction force moment (see col. 2, line 1), falls within the permissible range (see abstract, particularly "ground reaction force").

As per claim 7, Takenaka US 5459659 A teaches a control device that further comprising means that defines the restriction object amount falling within the permissible range as a desired floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21), and controls the operation of the robot so as to make the robot follow the desired floor reaction force moment (see abstract, particularly "ground reaction force").

As per claim 8, Takenaka US 5459659 A teaches a control device wherein the desired instantaneous value determining means determines an instantaneous value of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) by adjusting a motion that changes a vertical component or a component in floor surface normal line direction (see col. 30, lines 11-21) of an angular momentum changing rate of the robot among motions of the robot in order to hold the restriction object amount, which depends on a floor reaction force moment (see fig. 9 and abstract, particularly "ground reaction force") balancing with the desired motion on the dynamic model (see col. 1, line 56) and the compensating floor

reaction force moment, within the permissible range (see abstract, particularly "ground reaction force").

As per claim 9, Takenaka US 5459659 A teaches a control device wherein the motion that changes a vertical component or a component in floor surface normal line direction (see col. 30, lines 11-21) of an angular momentum changing rate of the robot is a motion of a body of the robot and/or an arm extended from the body (see fig. 9, wherein the leg being shown moving away from the trunk/body).

As per claim 10, Takenaka US 5459659 A teaches a control device (see fig. 9, particularly the micro attitude controller) of a legged mobile robot (see abstract, particularly "biped mobile robot") that travels by moving legs extended sequentially determine an instantaneous value of a desired motion of a legged mobile robot (see abstract, particularly "biped mobile robot") by using a dynamic model (see col. 1, line 56) expressing at least a relationship between a motion of the robot and a floor reaction force (see col. 2, line --), and also to control an operation of the robot at the same time so as to make the robot follow the determined instantaneous value of the desired motion, comprising: permissible range setting means for setting a permissible range of a restriction object amount, the restriction object amount being a vertical component of a floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21) or a component of the floor reaction force moment (see abstract, particularly "ground reaction force") in floor surface normal line direction to be applied to a robot in operation (see col. 30, lines 11-21), following the desired motion (see fig. 9); provisional instantaneous value determining means for sequentially determining a provisional instantaneous value of the desired motion (see col. 11, lines 48-54,

predicted value has been considered as instantaneous values); compensating floor reaction force moment (see abstract, particularly "ground reaction force") determining means for determining a compensating floor reaction force (see abstract, particularly "ground reaction force") moment, which is an additional floor reaction force moment (see abstract, particularly "ground reaction force") for bringing a difference between a desired state amount related to a posture of the robot about a vertical axis or a floor surface normal line axis and an actual state amount of the robot close to zero (see col. 2, line 60) on the basis of at least the difference; and desired instantaneous value determining means for determining an instantaneous value of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) by defining a portion of the restriction object amount, which deviates from the permissible range, as a moment correction manipulated variable (see abstract for correction of motion), the restriction object amount being determined on the basis of a floor reaction force moment (see abstract, particularly "ground reaction force") balancing with a provisional instantaneous value of the desired motion on the dynamic model (see col. 1, line 56) and the compensating floor reaction force moment (see abstract, particularly "ground reaction force"), and by correcting the provisional instantaneous value of the desired motion on the basis of the moment correction manipulated variable such that the deviating portion indicates a tendency to decrease (see abstract for correction of motion).

As per claim 11, Takenaka US 5459659 A teaches a control device wherein the desired instantaneous value determining means determines an instantaneous value of the desired motion (see col. 11, lines 48-54, predicted value has been considered as instantaneous values) by determining a correction amount of a provisional instantaneous value of the desired motion on

the basis of a result obtained by passing the moment correction manipulated variable (see abstract for correction of motion) through a low-pass filter (see col. 26, lines 14-21, wherein mathematical model has been considered as low-pass filter), and then by correcting the provisional instantaneous value on the basis of the determined correction amount (see abstract for correction of motion).

As per claim 12, Takenaka US 5459659 A teaches a control device that further comprising means for defining, as a desired floor reaction force moment (see abstract, particularly "ground reaction force"), a floor reaction force moment (see abstract, particularly "ground reaction force") corresponding to an already restricted restriction object amount that has been limited by restricting the restriction object amount, which is determined on the basis of a floor reaction force moment (see abstract, particularly "ground reaction force" and col. 28, line 66 -- to -- col. 30, line -21) balancing with a provisional instantaneous value of the desired motion on the dynamic model (see col. 1, line 56) and the compensating floor reaction force moment (see abstract, particularly "ground reaction force"), to fall within the permissible range, and for controlling an operation of a robot so as to make the robot follow the desired floor reaction force moment (see abstract, particularly "ground reaction force").

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takenaka (US 5459659 A) in view of Mueller et al. (US 6,560,539 B1).

As per claims 13 and 15-18, Takenaka US 5459659 A teaches an angular momentum changing rate of the robot on the basis of a provisional instantaneous value of the desired motion; a yaw angle or a yaw angular velocity of a body; slippage determining means for determining occurrence of a slippage, wherein the permissible range setting means variably sets the permissible range according to a determination result of the slippage determining means; wherein the slippage determining means determines the occurrence of a slippage on the basis of at least the ground speed of a distal portion of a leg in contact with the ground; and determines the occurrence of a slippage on the basis of at least the apparent spring constant.

Mueller et al. 6,560,539 B1 teaches an angular momentum changing rate of the robot on the basis of a provisional instantaneous value of the desired motion (see col. 6, lines 8-16); a vehicle a yaw angle or a yaw angular velocity of a body (see col. 4, line 41, particularly the yaw angular speed); slippage determining means for determining occurrence of a slippage, wherein the permissible range setting means variably sets the permissible range according to a determination result of the slippage determining means (see col. 4, particularly the slip control has been considered as means for determining slippage); wherein the slippage determining means determines the occurrence of a slippage on the basis of at least the ground speed of a distal portion of a leg in contact with the ground (see col. 4, particularly the slip control has been considered as means for determining slippage, and the brake has been taken as distal end); and determines the occurrence of a slippage on the basis of at least the apparent spring constant (see col. 11, lines 6-18, wherein indicating individual wheel, has been considered as occurrence of slippage).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the robot type of Takenaka, with the mechanical type of Mueller et al., because this modification would have introduced yaw angle, momentum angle and mechanical slippage into Takenaka's robot which being considered also as a mechanical device, thereby improving the efficiency and the reliability of the control device for legged robot.

As per claim 14, Takenaka US 5459659 A teaches a control device wherein the motion for changing a vertical component or a component in floor surface normal line direction (see col.

30, lines 11-21) of an angular momentum changing rate of the robot is a motion of a body of the robot and/or an arm extended from the body (see fig. 9, wherein the leg being shown moving away from the trunk/body).

As per claim 19, Takenaka US 5459659 A teaches a control device wherein the slippage determining means determines the occurrence of a slippage on the basis of at least a result obtained by passing an actual floor reaction force (see abstract, particularly "ground reaction force") acting on a leg in contact with the ground through a band-pass filter having a frequency passing characteristic in a range near a predetermined frequency (see col. 26, lines 14-21, wherein mathematical model has been considered as low-pass filter).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MCDIEUNEL MARC whose telephone number is (571)272-6964. The examiner can normally be reached on 6:30-5:00 Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi Tran can be reached on (571) 272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/McDieunel Marc/
Examiner, Art Unit 3664
/KHOI TRAN/
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